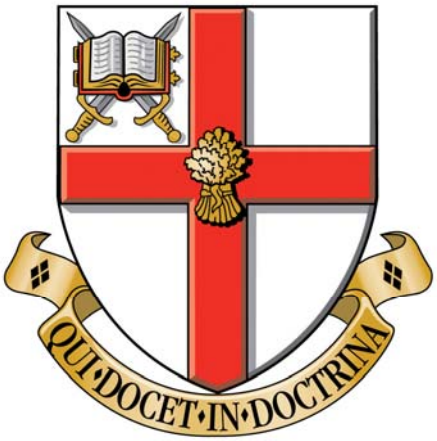


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# Some summary hand data from the N.W. Wales Hand Osteological Database

## Stephen Lewis

**Abstract**
Probably the richest store of osteological information lies in the radiographic images stored in X-ray departments. These have been greatly under-used. As an example of the sort of data available, some summary statistics from the N.W. Wales Hand Osteological Database are given. This data may be compared with historic or extant populations. Further data is available to colleagues on request.

**Introduction**
Probably the richest source of osteological information is to be derived from diagnostic radiographs. This information takes the form of black and white images from which data must be extracted. Diagnostic radiographs, as a source of osteological information have, however, been greatly under-used (Lewis, 1996a). Although clinical by nature and origin and, therefore, governed by rules of patient confidentiality etc., research workers are by no means debarred from access to them, given that the appropriate procedures are followed. Many departments of radiographic education, currently in the early days of offering degree courses, are looking to enhance their research base and would welcome approaches from osteologists with whom they might develop new work using what is, in effect, ready-gathered material waiting to be accessed.

**The N.W. Wales Hand Study**
An example of how radiographic material may be used is demonstrated by an osteological study of the human hand undertaken at University College Chester in collaboration with the X-ray department of Ysbyty Gwynedd, Bangor. This project has produced an extensive osteological database of skeletal morphometry and geometry for male and female hands which fellow osteologists are welcome to use. This study investigated metrical and non-metrical hand characteristics using just one form of hand radiograph: the dorsi-palmar projection. This projection is particularly useful for metrical work as the degree of magnification is kept to a minimum due to the close proximity of the part being imaged and the X-ray film. To date, one non-metrical analysis has so far appeared in the literature (Lewis, 1996b).

**Materials and Methods**
As radiographs are stored for only a certain period (usually about three years) before being sent for recycling, dorsi-palmar projection radiographs were saved from disposal. Without breaking patient confidentiality, it was possible, using an

indication of patient surname (Ashley and Davies, 1966) and town of residence, to exclude those whose names were uncharacteristic of Gwynedd and those non-resident in the county. In this way, one could build a body of data that is more likely to be representative of the present indigenous population. The sample comprised a total of 217 males and 113 females.

The lengths of each of the 19 metacarpal and phalangeal long bones of the hand were measured, according to the method originally set out by Parish (1966), using electronic callipers (Mitutoyo (U.K.) Ltd. Model 500-133U) and recorded to the nearest one hundredth of a millimetre. Before measurement, the orientation of each bone was assessed for suitability for measurement and omitted if not satisfactory. Thus, not all bones on every radiograph have been used.

For the purposes of the data presented here, measurements from left and right hands have been combined, as have those resident on Ynys Môn (Anglesey) and mainland Gwynedd, as no significant differences have been found when comparing the respective sub-groups.

**Results**

Summary data for the lengths of the 19 long bones is given in Table 1 (males) and Table 2 (females). Here, values for the mean have been rounded to the first decimal place and standard deviation has been calculated to the third decimal place. Values for minimum, maximum and range are also given and have been left at two decimal places.

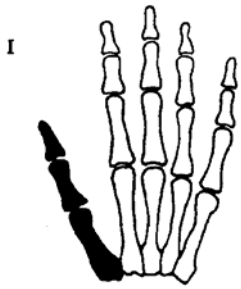
**Conclusion**

This data not only demonstrates the possibilities available when using clinical radiographs but allows comparisons with samples drawn from other times and/or places. Furthermore, for some material, sample sizes may be too small to confidently make estimates of variance. Knowing the way in which such parameters behave - as demonstrated by their summary statistics - may be used to fill such gaps in understanding.

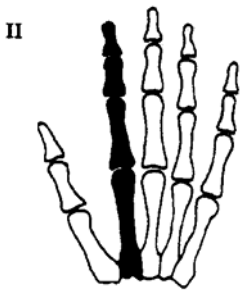
**References**

Ashley, D.J.B. and Davies, H. D. 1966 'The use of the surname as a genetic marker in Wales', *Journal of Medical Genetics* **3**:203-11.
Lewis, S. 1996a 'The osteological use of diagnostic radiographs: further material for osteoarchaeologists', *Organ* **14**: 10-12.
Lewis, S. 1996b 'Morphological aspects of male and female hand', *Annals of Human Biology* **23**: 491-4.
Parish, J.G. 1966 'Radiographic measurements of the skeletal structure of the normal hand', *British Journal of Radiology* **39**: 52-62.

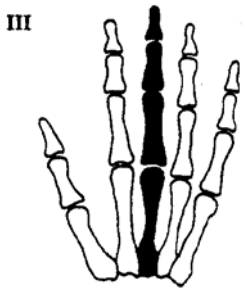
## Table 1 – Hand long bone lengths: males



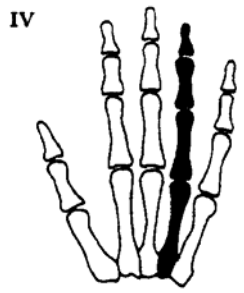

| | Metacarpal | Prox. Phalanx | Mid. Phalanx | Dist. Phalanx |
|---|---|---|---|---|
| | | | | |
| **Mean:** | **46.7** | **30.6** | **x** | **22.7** |
| **SD:** | **2.619** | **2.126** | **x** | **1.605** |
| **n:** | **217** | **215** | **x** | **210** |
| | | | | |
| **Min.:** | 39.63 | 22.53 | x | 19.07 |
| **Max.:** | 53.12 | 37.03 | x | 27.65 |
| **Range:** | 13.49 | 14.50 | x | 8.58 |



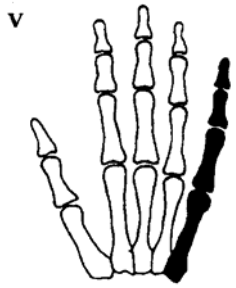

| | Metacarpal | Prox. Phalanx | Mid. Phalanx | Dist. Phalanx |
|---|---|---|---|---|
| | | | | |
| **Mean:** | **71.1** | **40.2** | **22.4** | **16.3** |
| **SD:** | **3.843** | **2.438** | **1.981** | **1.843** |
| **n:** | **216** | **217** | **177** | **176** |
| | | | | |
| **Min.:** | 61.54 | 35.20 | 17.08 | 11.60 |
| **Max.:** | 80.50 | 47.97 | 28.38 | 23.01 |
| **Range:** | 18.96 | 12.77 | 11.30 | 11.41 |




| | Metacarpal | Prox. Phalanx | Mid. Phalanx | Dist. Phalanx |
|---|---|---|---|---|
| | | | | |
| **Mean:** | **69.2** | **45.3** | **27.5** | **17.7** |
| **SD:** | **3.787** | **2.630** | **2.142** | **1.614** |
| **n:** | **216** | **217** | **181** | **180** |
| | | | | |
| **Min.:** | 59.57 | 39.66 | 22.06 | 13.41 |
| **Max.:** | 79.64 | 54.36 | 35.21 | 23.60 |
| **Range:** | 20.07 | 14.70 | 13.15 | 10.19 |

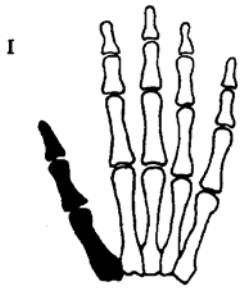



| | Metacarpal | Prox. Phalanx | Mid. Phalanx | Dist. Phalanx |
|---|---|---|---|---|
| | | | | |
| **Mean:** | **61.7** | **43.1** | **26.4** | **18.4** |
| **SD:** | **3.558** | **2.523** | **2.091** | **1.792** |
| **n:** | **216** | **217** | **181** | **180** |
| | | | | |
| **Min.:** | 50.40 | 37.72 | 20.84 | 12.58 |
| **Max.:** | 72.86 | 50.36 | 32.65 | 25.64 |
| **Range:** | 22.46 | 12.64 | 11.81 | 13.06 |

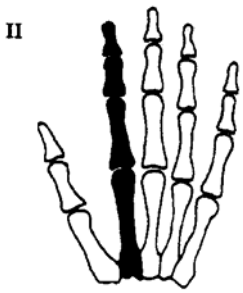



| | Metacarpal | Prox. Phalanx | Mid. Phalanx | Dist. Phalanx |
|---|---|---|---|---|
| | | | | |
| **Mean:** | **56.1** | **33.8** | **18.8** | **16.6** |
| **SD:** | **3.344** | **2.150** | **1.895** | **1.508** |
| **n:** | **211** | **216** | **184** | **184** |
| | | | | |
| **Min.:** | 46.64 | 28.89 | 46.67 | 12.58 |
| **Max.:** | 64.40 | 40.53 | 21.12 | 20.55 |
| **Range:** | 17.76 | 11.64 | 9.45 | 7.97 |

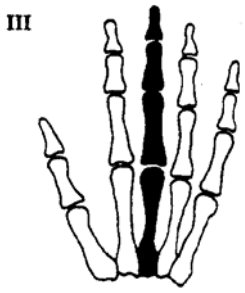
## Table 2 – Hand long bone lengths: females



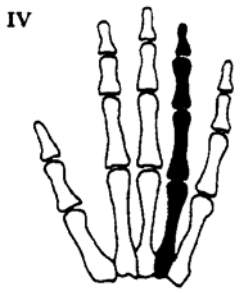

| | Metacarpal | Prox. Phalanx | Mid. Phalanx | Dist. Phalanx |
|---|---|---|---|---|
| | | | | |
| **Mean:** | **41.9** | **27.8** | **x** | **20.4** |
| **SD:** | **2.453** | **1.915** | **x** | **1.253** |
| **n:** | **111** | **110** | **x** | **110** |
| | | | | |
| **Min.:** | 35.75 | 23.53 | x | 16.93 |
| **Max.:** | 47.72 | 32.13 | x | 24.70 |
| **Range:** | 11.97 | 8.60 | x | 7.77 |



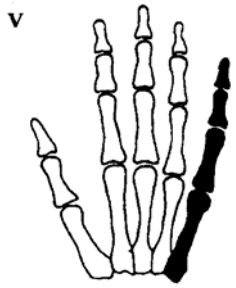

| | Metacarpal | Prox. Phalanx | Mid. Phalanx | Dist. Phalanx |
|---|---|---|---|---|
| | | | | |
| **Mean:** | **63.9** | **37.2** | **21.0** | **15.4** |
| **SD:** | **3.976** | **2.208** | **1.884** | **1.622** |
| **n:** | **111** | **111** | **91** | **91** |
| | | | | |
| **Min.:** | 50.75 | 32.19 | 16.17 | 9.70 |
| **Max.:** | 72.87 | 43.49 | 25.44 | 19.97 |
| **Range:** | 22.12 | 11.30 | 9.27 | 10.27 |




| | Metacarpal | Prox. Phalanx | Mid. Phalanx | Dist. Phalanx |
|---|---|---|---|---|
| | | | | |
| **Mean:** | **61.8** | **41.3** | **25.5** | **16.4** |
| **SD:** | **3.727** | **2.353** | **2.067** | **1.429** |
| **n:** | **111** | **111** | **93** | **93** |
| | | | | |
| **Min.:** | 50.85 | 34.85 | 19.65 | 11.85 |
| **Max.:** | 70.61 | 48.34 | 30.13 | 20.42 |
| **Range:** | 19.76 | 13.49 | 10.48 | 8.57 |




| | Metacarpal | Prox. Phalanx | Mid. Phalanx | Dist. Phalanx |
|---|---|---|---|---|
| | | | | |
| **Mean:** | **55.2** | **38.9** | **24.5** | **16.9** |
| **SD:** | **3.321** | **2.270** | **1.944** | **1.410** |
| **n:** | **111** | **111** | **93** | **93** |
| | | | | |
| **Min.:** | 46.59 | 34.36 | 19.06 | 12.80 |
| **Max.:** | 61.91 | 46.70 | 28.50 | 20.32 |
| **Range:** | 15.32 | 12.34 | 9.44 | 7.52 |




| | Metacarpal | Prox. Phalanx | Mid. Phalanx | Dist. Phalanx |
|---|---|---|---|---|
| | | | | |
| **Mean:** | **50.6** | **30.4** | **17.1** | **15.3** |
| **SD:** | **2.868** | **1.919** | **1.770** | **1.259** |
| **n:** | **111** | **111** | **96** | **96** |
| | | | | |
| **Min.:** | 44.14 | 25.96 | 11.65 | 12.40 |
| **Max.:** | 56.69 | 35.37 | 20.62 | 18.69 |
| **Range:** | 12.55 | 9.41 | 8.97 | 6.29 |